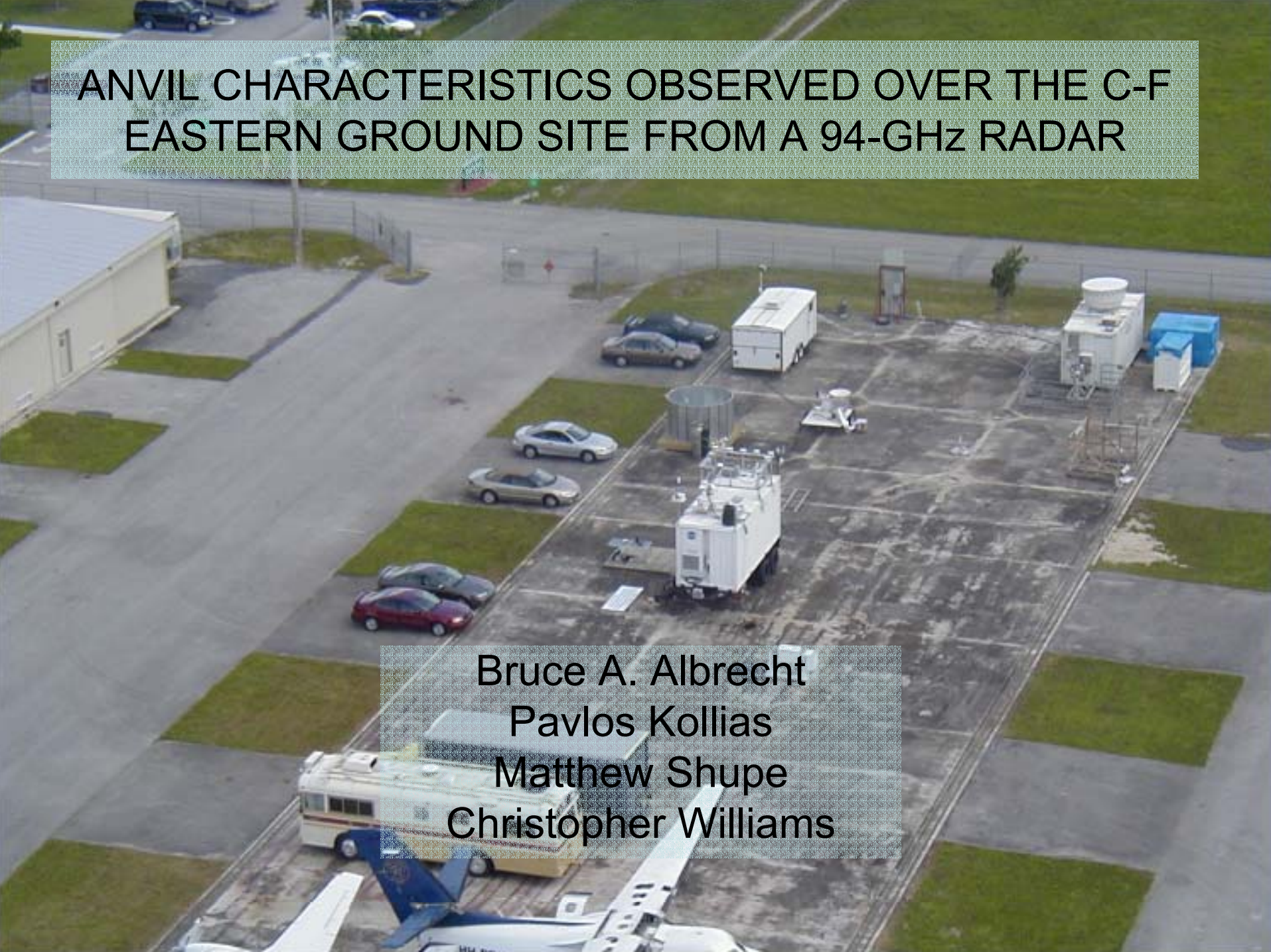


ANVIL CHARACTERISTICS OBSERVED OVER THE C-F EASTERN GROUND SITE FROM A 94-GHz RADAR

Bruce A. Albrecht
Pavlos Kollias
Matthew Shupe
Christopher Williams



C-F Eastern Ground Site - Radar Super Site

NOAA, AL, S-band radar

Rayleigh and Bragg scattering

No attenuation in rain

Dual operational mode (Cloud – Precipitation)

Resolution: 30 sec, 100 m.

NOAA, ETL K_a-band radar

Rayleigh scattering

High sensitivity for cirrus clouds

ARM/MMCR operational strategy (4 modes)

Resolution: 8 sec, 45 m

University of Miami, W-band radar

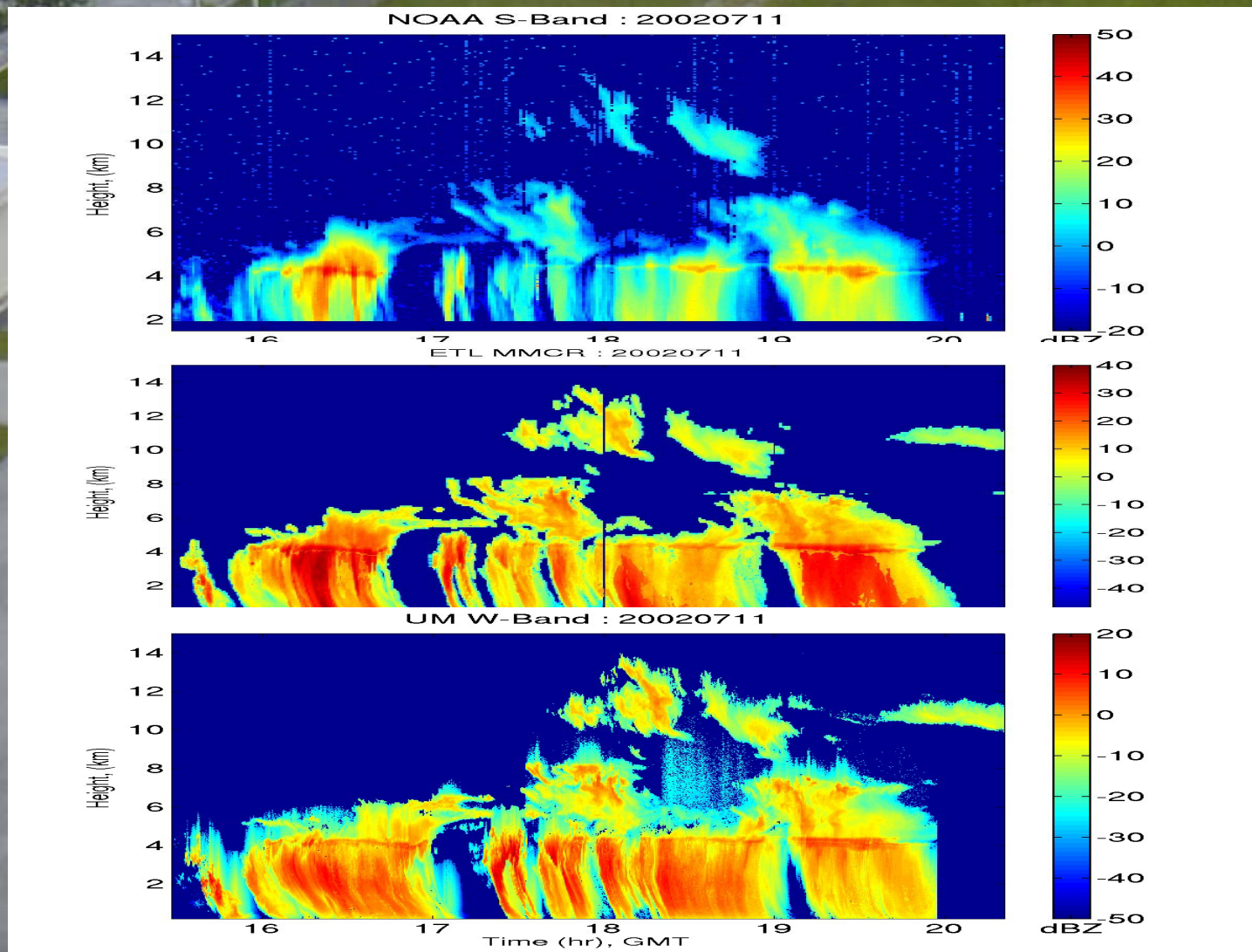
Rayleigh and Mie scattering

High sensitivity

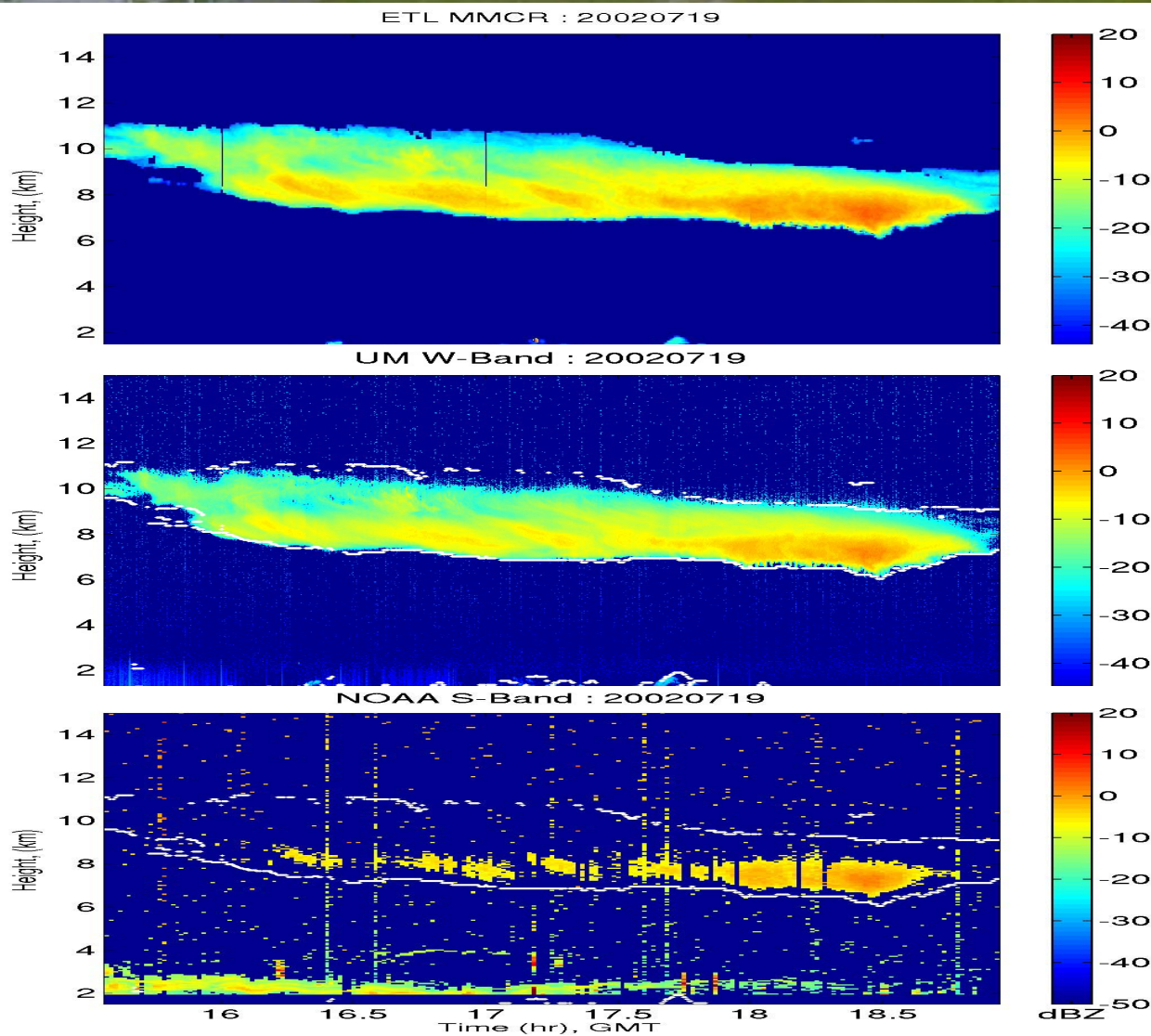
Single mode operations

Resolution: 2 sec, 30 m

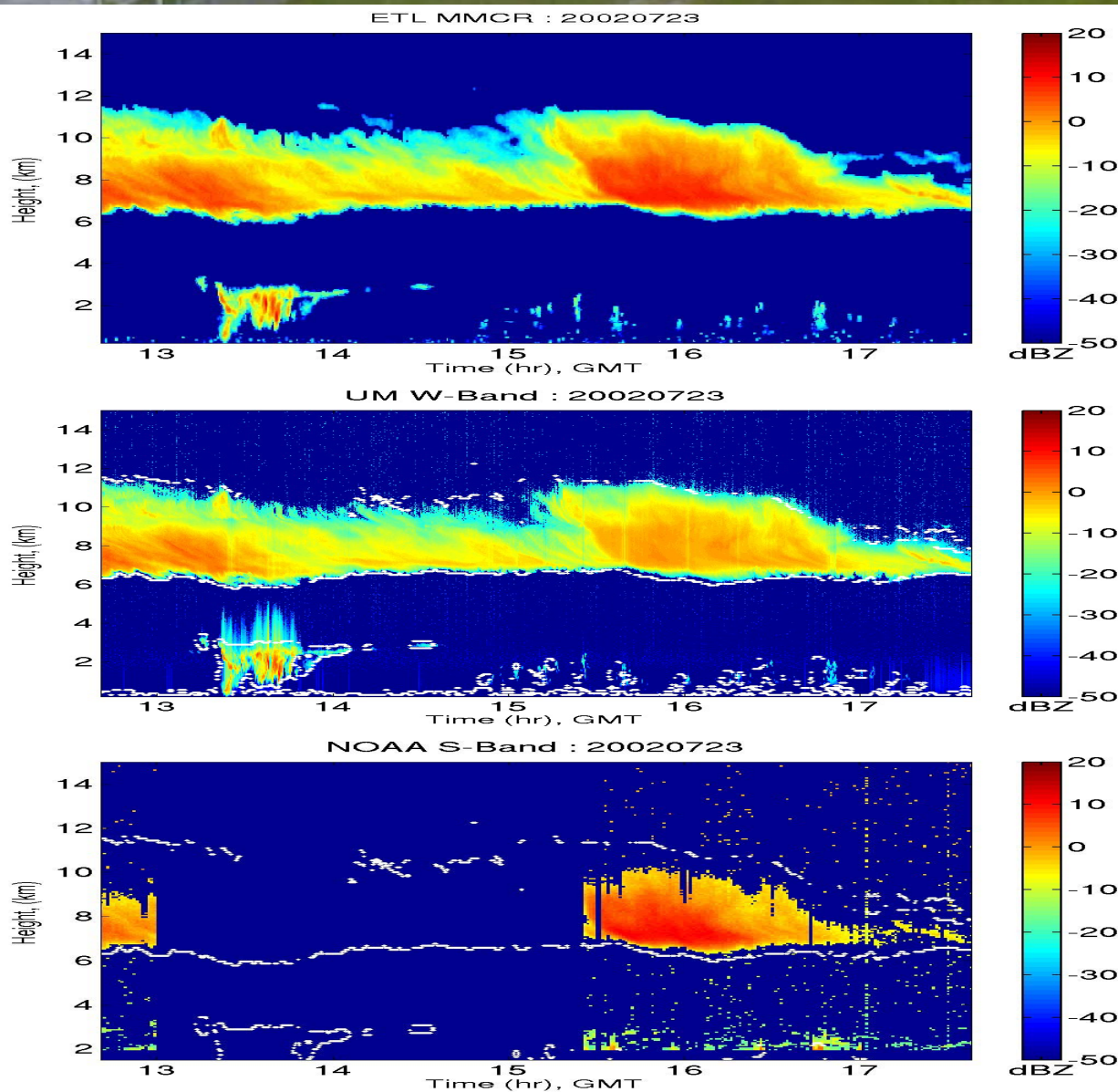
Precipitation



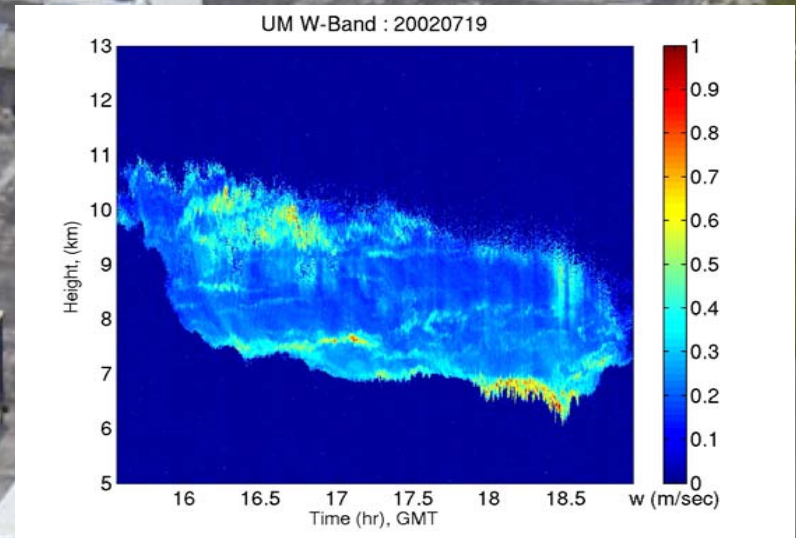
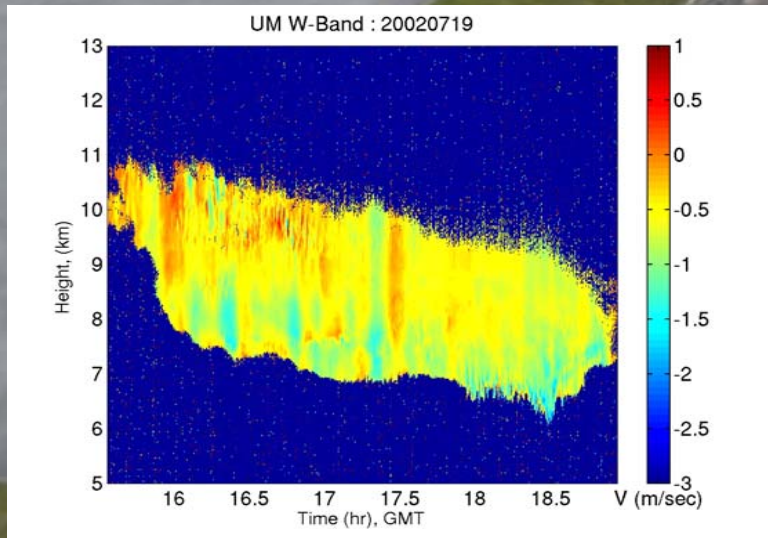
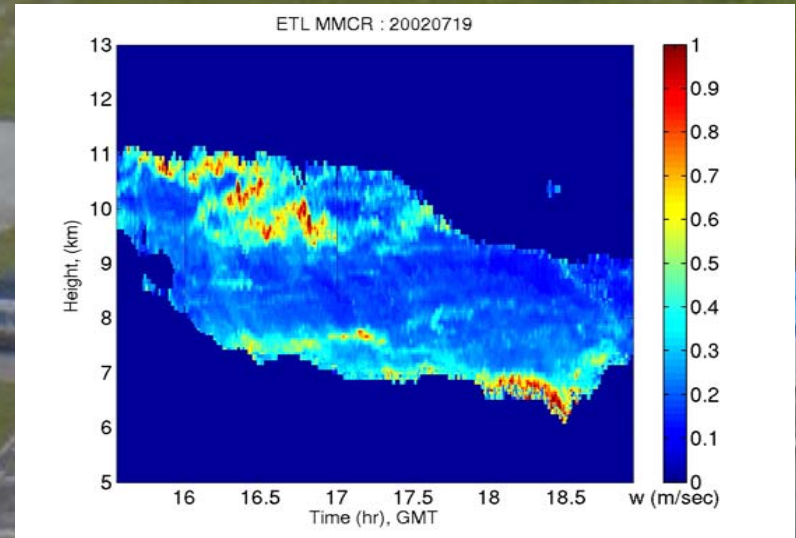
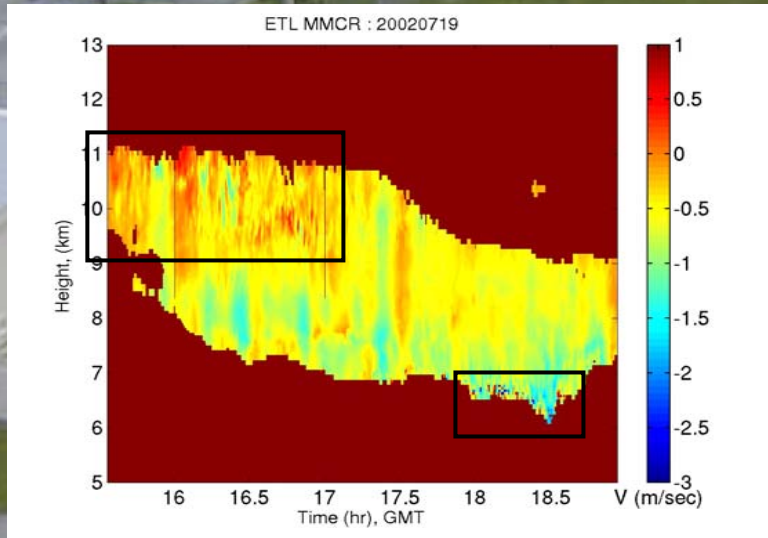
Cirrus Detection (I)



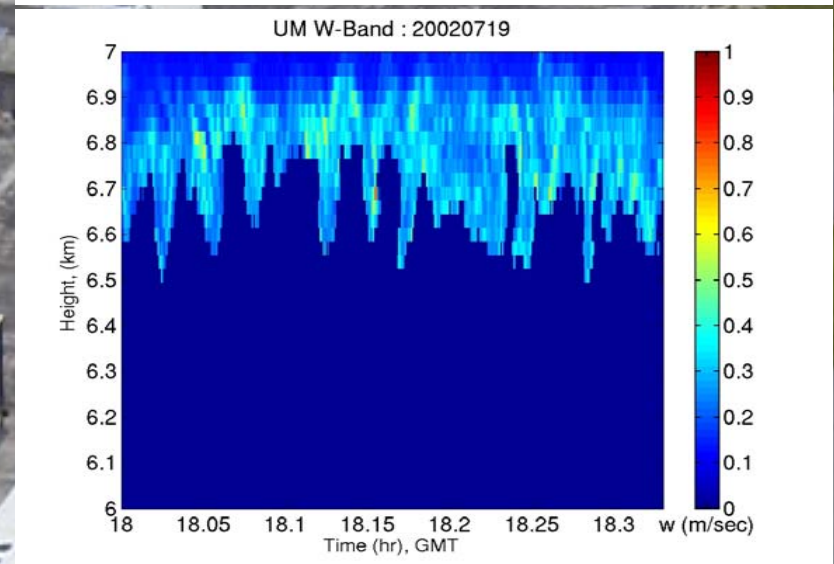
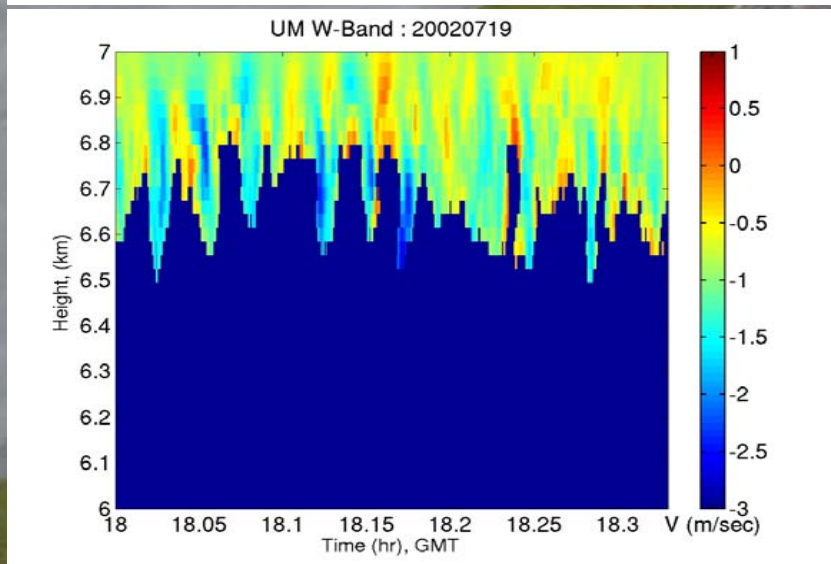
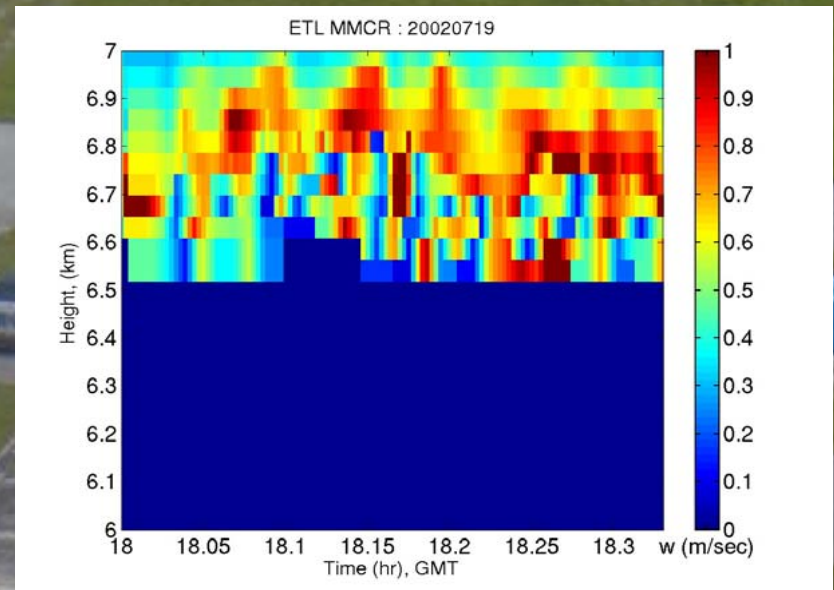
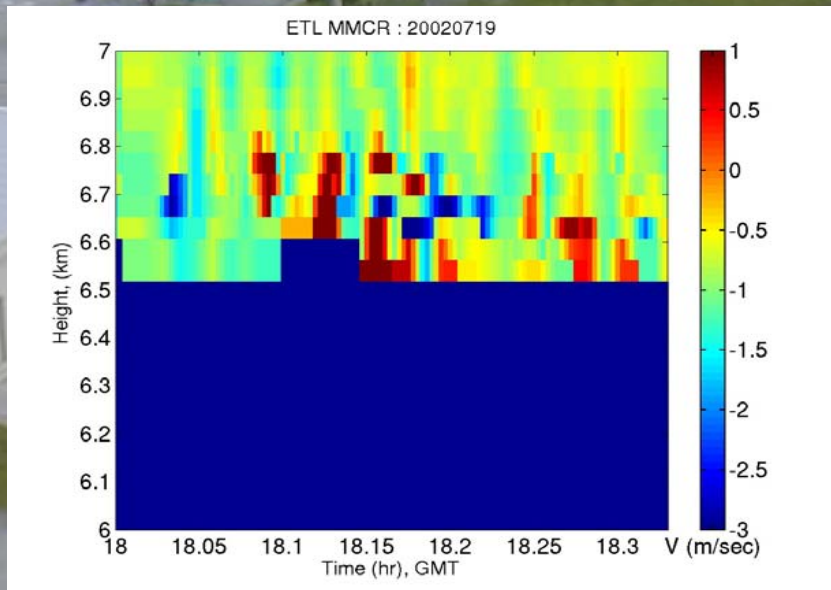
Cirrus Detection (II)



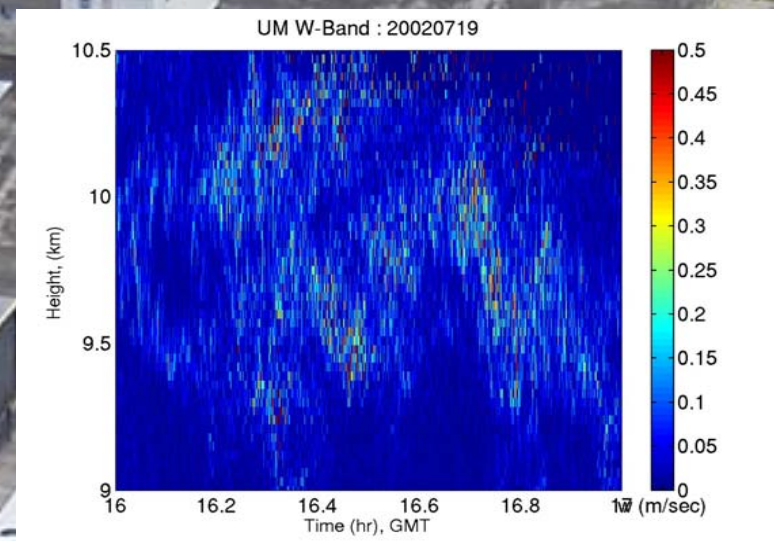
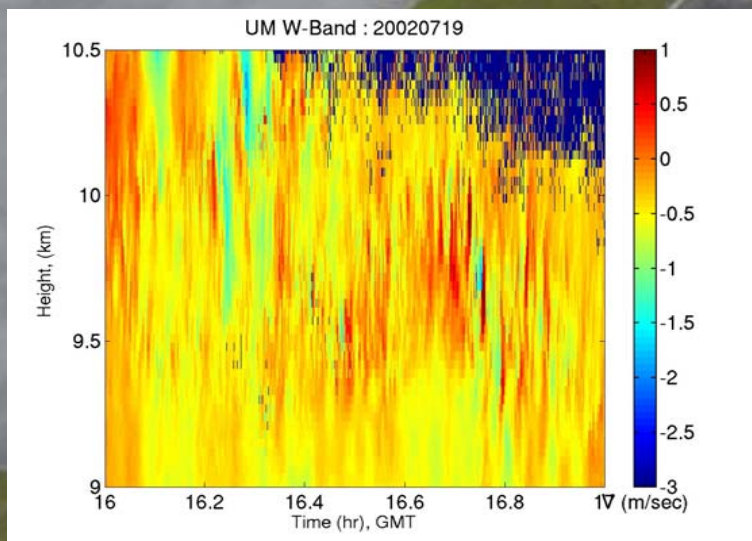
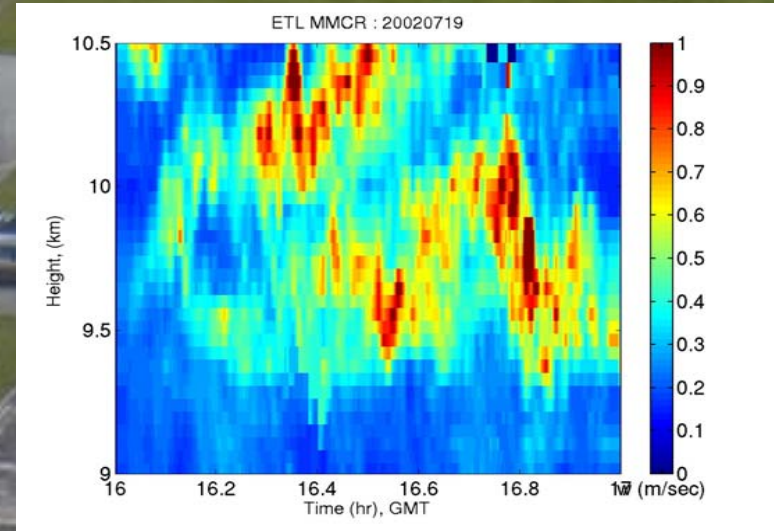
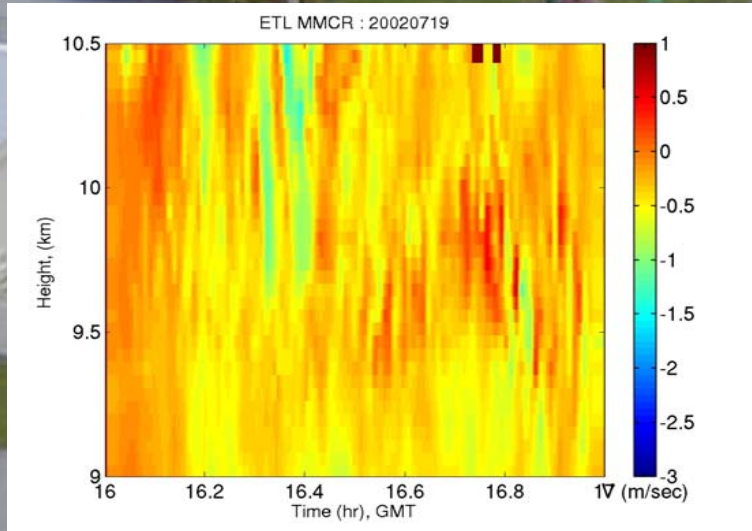
Doppler Moments



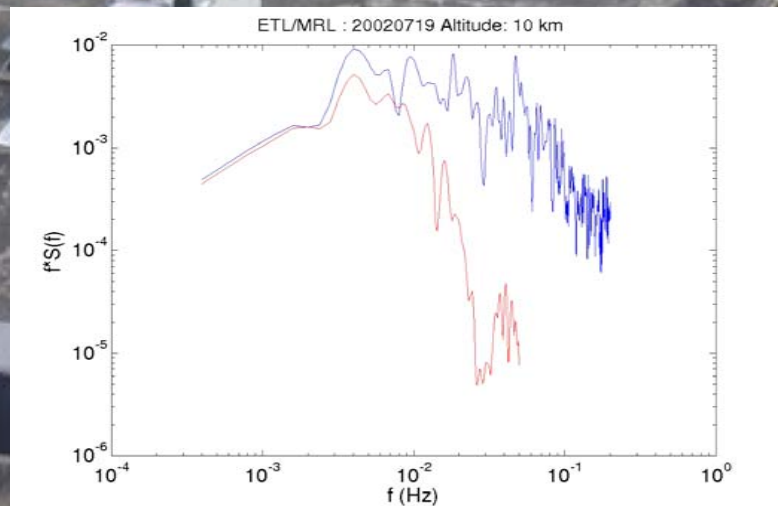
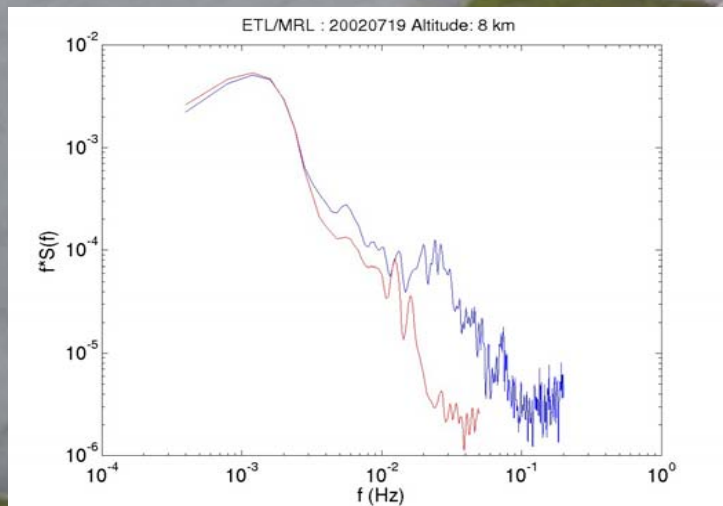
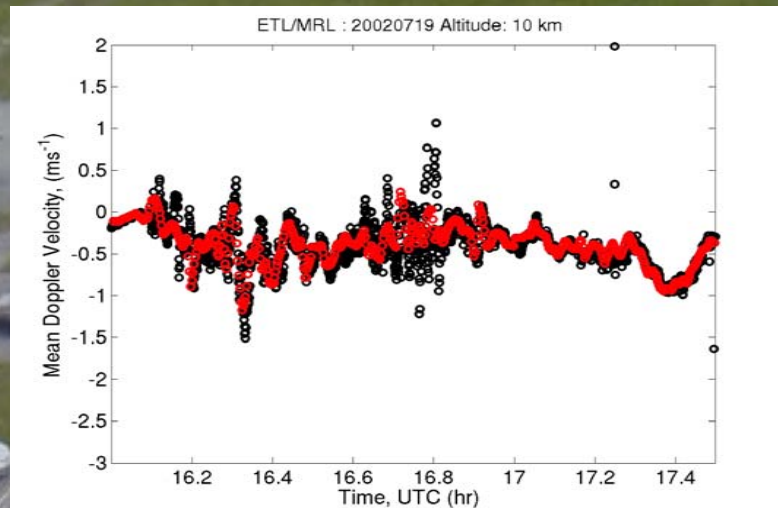
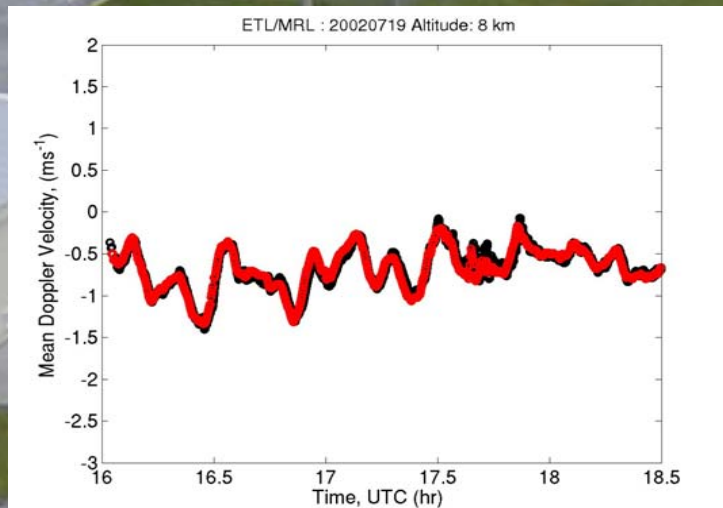
Mammatus



Cloud Turbulence (I)



Cloud Turbulence (II)



Future Work

Question: Can we use the Doppler spectra for microphysical and turbulence retrievals?

In cirrus

- Produce t-z maps of turbulent “active” and “quiet” areas within the cirrus and horizontal wind shear zones. Use the Doppler spectra from the K and W band radars to quantify turbulence characteristics in various scales.
- Apply turbulence broadening corrections on the recorded Doppler moments and spectra used for microphysical retrievals.
- Compare the areas of dynamical and microphysical interest and infer coupling mechanisms between kinematics and microphysics.

In precipitation

- Apply the “Mie” technique at the W-band data set and retrieve air motion and DSD shapes in stratiform rain or precipitating cirrus layers.
- Use the S-band cloud reflectivity and disdrometer data to scale the microphysical retrievals and conduct surface rainfall and DSD comparisons

Summary

Three radar profiling systems were collocated at the eastern ground site during CRYSTAL-FACE. The NOAA S-band, the ETL K-band and the Univ. of Miami W-band.

The ETL K-band exhibit the best sensitivity in cirrus clouds. The use of different operational modes allow the mapping of the hydrometeor distribution over the site. The cirrus cloud boundaries and morphology were well defined by the MMCR

The NOAA S-band exhibit great operational stability and provided non attenuated profiles of cloud reflectivity during precipitating periods (25% of total observation time).

The Univ. of Miami W-band operated during daytime periods and provided high resolution Doppler moments valuable for turbulent studies in cirrus clouds.